

Nathan:

Thanks for putting all of this together for all of us to look over. I think I have more questions than recommended changes though.

1) Is the life cycle reasonable?

I think it is overall, and would certainly go with Bob and Katie's views on this. Do you know how sensitive the model is to the 250 km maximum dispersal distance for recruits? That value seems very large – certainly a maximum, but my understanding is that very few animals have been found to disperse that far. How sensitive is the output to the assumption about repulsion (0% in hexagons scored 10 and 90% in hexagons scored 0)? Should this assumption be informed by some of the analyses that Dave LaPlante is currently running (looking at the distribution of mean Maxent scores within HexSim hexagons – that analysis is only occurring at the nest sites though)? I think that the assumption that a hexagon with a score 60 or more is needed for dispersing birds to stop should also be informed by Dave's evaluation. (FYI, we're expecting that early this week).

Under "Record Locations" you noted that individual owls determine which modeling region they are located in. I'm assuming that they can move between/among modeling regions – is this correct?

2) Is my cross-walk between modeling regions and provinces correct and adequate?

As far as I can tell it looks fine – again, I would go with Bob, Katie, Brian and others on this one.

3) Are my province-specific data (territory size, territory resource targets, home range size, home range resource targets) acceptable? I suspect there is more variability in home range size than captured here... I'll also address the question (4) "Are my assumptions reasonable in the section titled 'notes on range size and resources'?"

I think the new assumption that territory size is one hexagon (86.6 ha) is too small. We've asked Dave LaPlante to provide some evaluations of the mean Maxent values by HexSim hexagons around known owl sites – for the hexagon the owl nest is located in, as well as the next 1, 2, 3, and 4 closest hexagons to the owl nest location. These are all potential "territory" sizes in HexSim. Perhaps 5 hexagons is too big, but it does seem that 1 is too small. Won't territory size set an upper limit on the absolute potential density of owls? Doesn't it also define a use area that is unavailable to other owls (to acquire resources from) in the simulation? If so, then I think we need a value larger than 1 hexagon – especially given that we'll be applying that uniform territory size range-wide. Maybe 3 hexagons is a happy medium?

In terms of the resource targets for home ranges, what you've started with is fine with me, but I think for the production runs of HexSim we should have those values informed by the analyses that Dave LaPlante is currently running. For the home-range scale evaluations, he is going to provide (for each NSO nest by Province/state, and for the HexSim hexagons approximating the minimum, median, and maximum home range values – as in the Table Nathan provided): the distribution of home-range hexagons among 10 equal-sized mean Maxent bins. See blank table below. We will then summarize the data by province/state and min, med., and max. home range sizes. That is, we'll determine the proportion of owls that had at least x% of their hexagons falling within the (for example) 80.01-90, 70.01-80, 60.01-70, 50.01-60...bins. This should help inform the resource target values that are set.

			Proportion of Hexagons with mean Maxent Value for minimum sized home ranges (21 hexagons)									
State	Province	Owl #	0-10	10.01-20	20.01-30	30.01-40	40.01-50	50.01-60	60.01-70	70.01-80	80.01-90	>90
WA	Olympic	a										
WA	Olympic	b										
WA	Olympic	c										
WA	Olympic	d										

			Proportion of Hexagons with mean Maxent Value for median sized home ranges (67 hexagons)									
State	Province	Owl #	0-10	10.01-20	20.01-30	30.01-40	40.01-50	50.01-60	60.01-70	70.01-80	80.01-90	>90
WA	Olympic	a										
WA	Olympic	b										
WA	Olympic	c										
WA	Olympic	d										

			Proportion of Hexagons with mean Maxent Value for maximum sized home ranges (128 hexagons)									
State	Province	Owl #	0-10	10.01-20	20.01-30	30.01-40	40.01-50	50.01-60	60.01-70	70.01-80	80.01-90	>90
WA	Olympic	a										
WA	Olympic	b										
WA	Olympic	c										
WA	Olympic	d										

#### 4) Are my assumptions reasonable in the section titled “notes on movement”?

In terms of settling – “birds settle if they can identify a vacant territory with a cumulative score of at least 300.”

I think this too should be informed by Dave’s analyses. His analyses won’t give us specific information on how birds settle, but we will have information on the distribution of hexagon scores by individual birds (for various territory sizes, see above). We can perhaps choose a relatively low threshold from the observed data (e.g., birds will settle if the cumulate resource target for the territory is at least that which was observed by 90% (or 95%) of the owls we have data for.

- 5) Are the population size data in the attached files too high or too low?

I'll go with Bob and Katie here.

- 6) Is it reasonable to assume that breeding quality hexagons are those scored 60 and above (in the MaxEnt data)?

Let's see what the data Dave is analyzing tells us about this. For now I think we should consider 60 a place-holder.

- 7) How will we add the barred owl influence on survival given that I've stratified survival rates by stage class and resource acquisition class?

My take on this is that it depends on the assumptions we make about how barred owls influence spotted owls. If we assume that the primary influence is via exploitative competition, then we'd need to "populate" each HexSim scenario with a particular number of barred owls (with a spatial distribution from north to south that approximates what we currently know or estimate/guess??) and give barred owls some exclusive areas (perhaps here one hexagon is reasonable) as well as a home range from which they acquire resources. Barred owls would then influence NSOs by making fewer resources available (no resources available from their territories and some fraction available from their home ranges). If we assume that interference competition is the primary way that barred owls influence NSOs, we might want to increase the size of barred owl territories to the size of their estimated home ranges (that is, their home ranges would be "defended" against NSOs, and thus NSO could acquire no resources from barred owl home ranges) -- that is, even fewer resources would be available for NSOs. Once these decisions are made, we could alter the abundance of barred owls in the landscape and see how that influences NSOs.

Thanks again for putting all of this together in a coherent and comprehensive way Nathan! I hope my comments are helpful.

Jeff